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USRL Calibration Report No. 1732
Project No. RP-2229

LEVEL II

MOST Project - 4

(12) 6 pi

(6) Calibration of

Bell Telphone Laboratories Pressure-gradient Hydrophones

Type DTH, Serials 4 and 5.

(14) USRL-CALIBRATION-1732

(11) 12 May 1961

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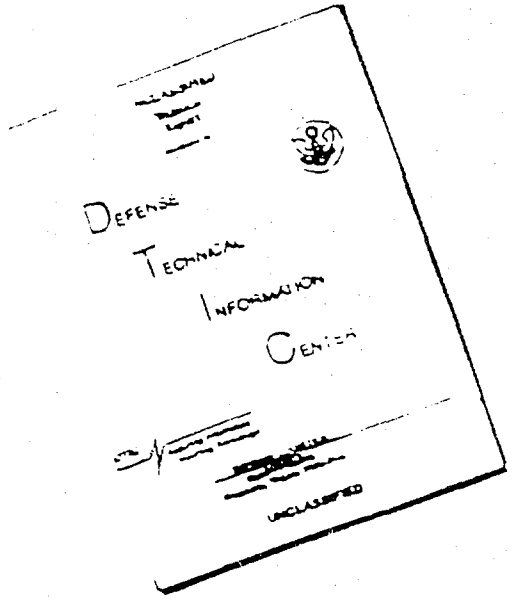

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JED/hs
RP-2229
12 May 1961

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CALIBRATION REPORT No. 1732

Subj: Bell Telephone Laboratories pressure-gradient hydrophones type DTH serials 4 and 5; calibration of

Ref: (a) BUSHIPS spdltr 9670/14 ser 689D-44 of 18 Jan 1961
(b) USRL Cal Report No. 1686 of 21 Dec 1960 (RP-2176)
(c) USRL Cal Report No. 1709 of 15 Mar 1961 (RP-2199)

Encl: (1) Drawings USRL 24950 through 24952 and 20113

1. Calibration of subject hydrophones was requested by reference (a) in connection with contract NOas-59-6134C. These measurements are a continuation of those reported in references (b) and (c). Mr. John Meyer of Bell Telephone Laboratories was present to observe and assist with the measurements.

2. The hydrophones had no designated type so the same designation was used as before. The two hydrophones appeared to be similar; serial 4 has previously been reported on in reference (c).

3. One set of metal end tubes was used to extend the effective length of the hydrophones. Each end tube had a short cylindrical section 5-1/2 inches inside diameter to slide over the end of the hydrophone, and a larger cylindrical section 4 inches inside diameter extending outward 6-1/4 inches from the diaphragm. Most of the time was spent in experimenting with different methods of removing trapped air bubbles from within the end tubes. As none of the methods was completely successful, only one set of data employing the end tubes was computed; the results are shown in drawing USRL 24950, enclosure (1). Free-field sensitivities of the two hydrophones without the end tubes are shown in drawings USRL 24951 and 24952.

4. Orientations were in accordance with the method described on drawing USRL 20113, enclosure (1), for a piston-type hydrophone. The cylindrical axis coincided with the X axis, and the cable extended from the hydrophone in the -Y direction.

5. All measurements reported here were made in accordance with American Standard Procedures for Calibration of Electroacoustic Transducers Particularly Those for Use in Water Z24.24-1957.

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J. E. DONOVAN
Data Analyst

Copy to:
BUSHIPS (Code 689D)(1)
BTL, Murray Hill (J. A. Meyer)(1)
USRL Code 210 (1)

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P. O. Box 8337, Orlando, Florida

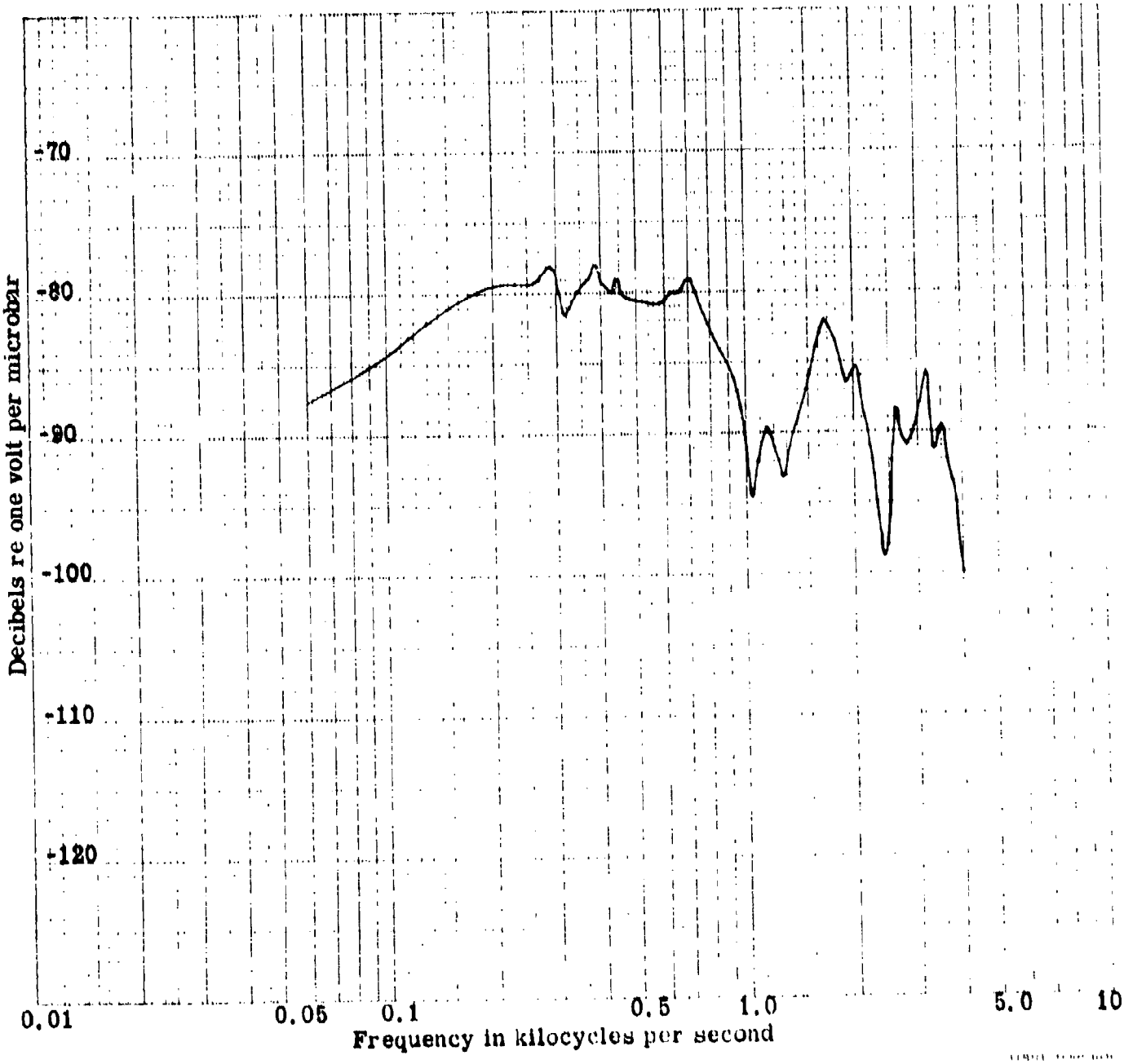
USRL No. 24950
Proj No. RP-2229
Date May 1961

FREE-FIELD VOLTAGE SENSITIVITY

BTL Pressure-gradient Hydrophone
Type DTH serial 4
With tubes
Open-circuit voltage at end of 48-ft cable
Unbalanced

Water temp: 17 °C

MEASUREMENTS MADE IN ACCORDANCE WITH AMERICAN STANDARD Z 24.24 1957



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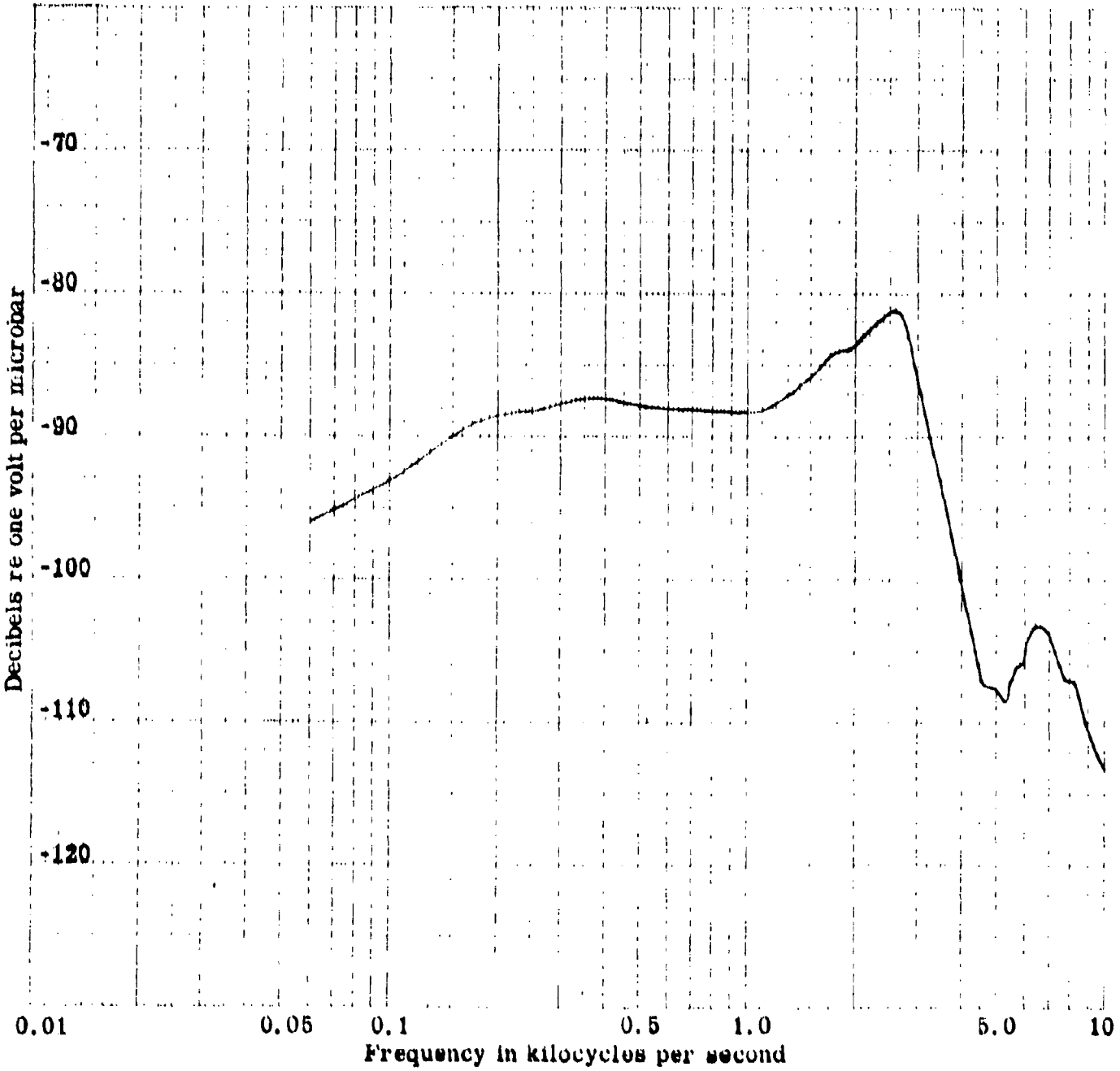
USRL No. 24951
Proj No. RP-2229
Date May 1961

FREE-FIELD VOLTAGE SENSITIVITY
BTL Pressure-gradient Hydrophone
Type DTH Serial 4
Open-circuit voltage at end of 48-ft cable
Unbalanced

Water temp 17 C

MEASUREMENTS MADE IN ACCORDANCE WITH AMERICAN STANDARD C 24.24-1957



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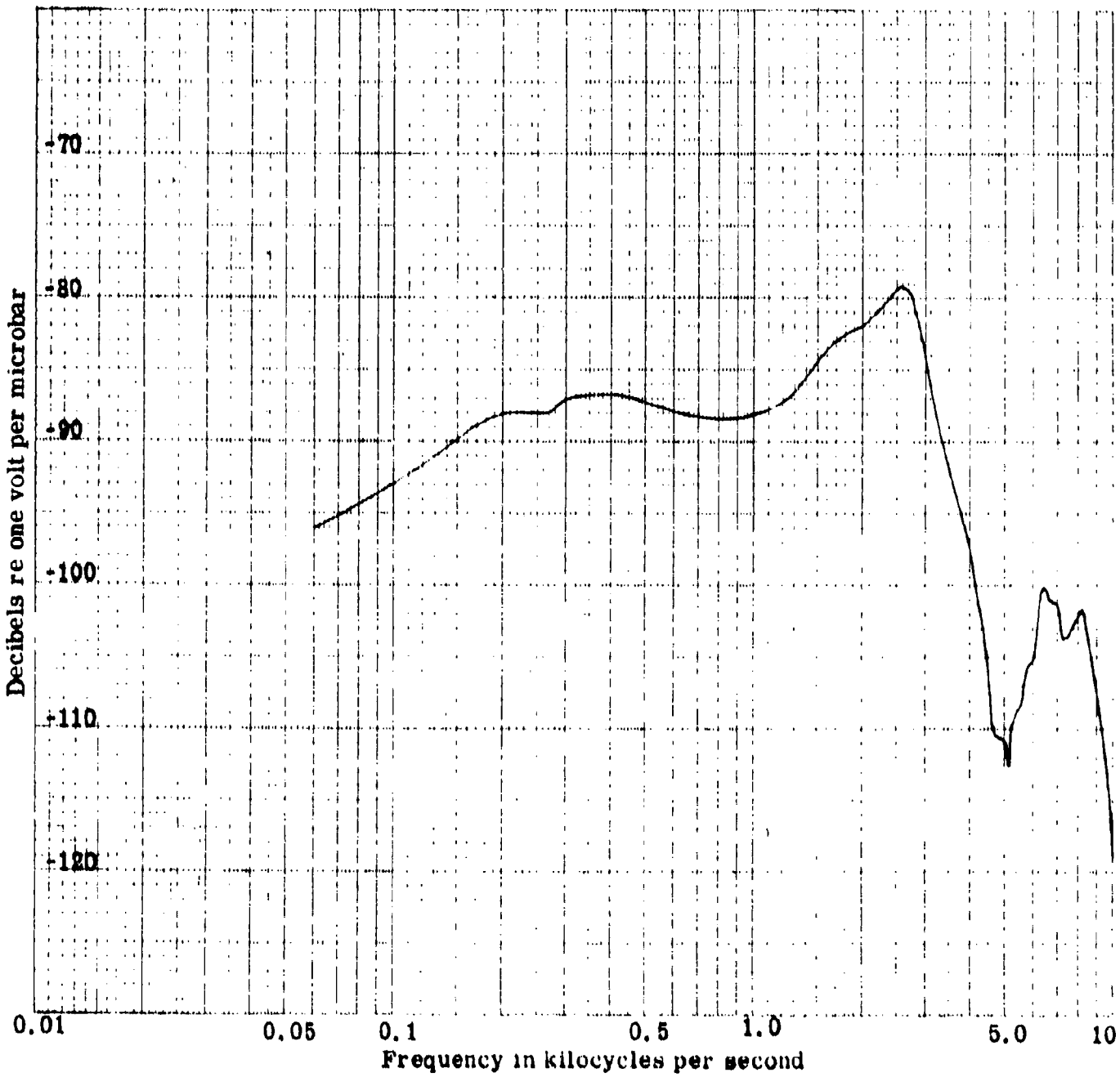
U. S. N. 24952
Rpt. No. RP-2229
Date May 1961

FREE-FIELD VOLTAGE SENSITIVITY

BTL Pressure-gradient Hydrophone
Type DTH Serial 5
Open-circuit voltage at end of 48-ft cable
Unbalanced

Water temp 17 C

MEASUREMENTS MADE IN ACCORDANCE WITH AMERICAN STANDARD Z 24.24 1957



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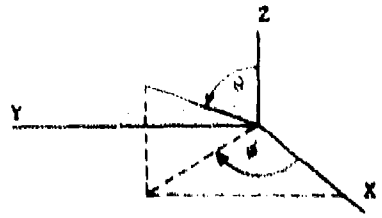
P. O. Box 8337, Orlando, Florida

USRL No. 20113

15 May 1958

COORDINATE SYSTEM FOR TRANSDUCER ORIENTATION

The left-handed coordinate system of the American Standard Procedures for Calibration of Electroacoustic Transducers Particularly Those for Use in Water, Z24.24-1957, is used. The transducer is fixed with respect to the coordinate system and has its acoustic center at the origin. The angle ϕ is equivalent to the azimuth angle in sonar operation.



PLACEMENT OF TRANSDUCER IN COORDINATE SYSTEM

Transducer Type	Tranaducer Orientation in Coordinate Syatom
Point, or Spherical	Points on surface that coincide with the X and Z axes shall be specified.
Cylindrical, or Line	The axis of the cylinder or line shall coincide with the Z axis. A reference mark in the XZ plane and in the direction of the positive X axis will be specified.
Plane, or Piston	The plane or piston face shall be in the YZ plane with the X axis normal to the face at its acoustic center. A reference mark in the XZ plane and in the direction of the positive Z axis will be specified.
Other Configurations	Orientation shall be shown by sketch or description. This category includes line and piston types of transducers operated in an orientation other than those specified above.

ORIENTATIONS FOR RESPONSE AND DIRECTIVITY MEASUREMENTS

Response. The calibration measurements are made for sound propagated parallel to the positive X axis (ϕ = 0, θ = 90), unless otherwise specified on the response curve.

Directivity. The plane of the pattern is specified, and the following conventions are observed, if another orientation is not specified on the pattern.

XY Plane: The positive X axis (ϕ = 0, θ = 90) coincides with the zero-degree direction on the pattern and the positive Y axis (ϕ = 90, θ = 90) is at 90 degrees measured in a clockwise direction. Rotation is around the Z axis; the positive Z axis is directed upward from the plane of the paper.

XZ Plane: The positive X axis coincides with the zero-degree direction and the positive Z axis (θ = 0) is at 90 degrees measured in a clockwise direction. Rotation is around the Y axis; the negative Y axis is directed upward from the plane of the paper.

YZ Plane: The positive Y axis coincides with the zero-degree direction and the positive Z axis is at 90 degrees measured in a clockwise direction. Rotation is around the X axis; the positive X axis is directed upward from the plane of the paper.